Chapter 1: Planet Earth

All the following "answers" are for your reference only!
The "best" answers are based on your actual experimental results!

Experiment 1.1 : Obtaining common salt from muddy sea water

1. beakers, evaporating dish, funnel, glass rod, stand and ring, Bunsen burner, matches, fireproof mat, wire gauze, tripod, filter paper.

2. (a) Pour the muddy sea water into a filter funnel fitted with a piece of filter paper. Collect the filtrate in an evaporating dish.

   (b) Evaporate the filtrate to obtain the common salt.

3. Refer to NOTE. Filtration and Evaporation set-up.

Experiment 1.2 : Obtaining pure water from sea water

1. Refer to NOTE. Distillation set-up.

2. Temperature of the liquid distils over is **100** °C.

3. The distillate is colourless.

4. The distillate is pure water.

5. To ensure even boiling / smooth boiling.

Experiment 1.3 : What does common salt contain?

Part I

9. Observations:

Compound	Colour of the flame
Calcium carbonate	**Brick red**
Copper(II) carbonate	**Bluish green**
Potassium carbonate	**Purple**
Sodium carbonate	**Golden yellow**
Calcium chloride	**Brick red**
Copper(II) chloride	**Bluish green**
Potassium chloride	**Purple**
Sodium chloride	**Golden yellow**
Common salt from sea water	**Golden yellow**

10. The common salt from sea water contains sodium because it gives a golden yellow flame in flame test.

11. Common salt from sea water contains **sodium**.

12. Carry out a flame test. A solid sample containing calcium will give a brick red flame.

Part II

9. Testing common sodium compounds

Compound	Test	Observations
Sodium carbonate	Dilute hydrochloric acid	**Gas bubbles are given off**
Sodium chloride	Dilute nitric acid followed by silver nitrate solution	**A white precipitate appears**
Sodium sulphate	Dilute hydrochloric acid followed by barium chloride solution	**A white precipitate appears**

10. Testing common salt from sea water

Test	Observations
Dilute hydrochloric acid	**No observable change**
Dilute nitric acid followed by silver nitrate solution	**A white precipitate appears**
Dilute hydrochloric acid followed by barium chloride solution	**No observable change**

11. The common salt from sea water is a chloride because it gives a white precipitate with dilute nitric acid followed by silver nitrate solution. It is a compound made up of chlorine.

12. Besides sodium, common salt from sea water contains **chlorine**.

13. (a) Carry out a flame test. The sample gives a purple flame.
    (b) Dissolve the sample in water. Add 2 cm^3 of dilute nitric acid, followed by a few drops of silver nitrate solution. A white precipitate shows that the sample is a chloride.

Experiment 1.4 : Testing the presence of water in copper(II) sulphate crystals

7. Observations:

Action of some liquids on dry cobalt(II) chloride papers

Liquid	Effect on dry cobalt(II) chloride paper
Water	**The paper turns from blue to pink**
Ethanol	**No observable change**
Oil	**No observable change**

Testing for the presence of water in copper(II) sulphate crystals

	Observations
Colour change of copper(II) sulphate crystals upon heating	**From deep blue to white**
Appearance of liquid collected	**Colourless**
Testing liquid collected with dry cobalt(II) chloride paper	**The paper turns from blue to pink**

8. (a) Water turns the colour of dry cobalt(II) chloride paper from **blue** to **pink**.
   (b) Liquids not containing **water** cannot cause the same colour change in dry cobalt(II) chloride papers.

9. Copper(II) sulphate crystals are **blue** in colour. Upon heating, they lose **water** and become **white** in colour. The **water** lost turns the colour of dry cobalt(II) chloride paper from **blue** to **pink**.

10. To avoid the water condensed from flowing back into the hot part of the boiling tube. This may crack the boiling tube.

11. To avoid "sucking back" of water. The water may crack the hot boiling tube.

Experiment 1.5 : Investigating the action of heat, water and dilute acids on calcium carbonate

6.

Stage	Observations
Heating for 10 – 15 minutes	**A white powdery solid remains**
Blowing through the filtrate	**The filtrate turns milky**

7. Calcium carbonate is [soluble / **insoluble**] in water.

8. (a) Calcium carbonate is [**soluble** / insoluble] in dilute hydrochloric acid.

   (b) The gas given off turns limewater **milky**. The gas is **carbon dioxide**.

9. (a) Upon heating, calcium carbonate changes to **calcium oxide**. **Carbon dioxide** is also given off.
   When water is added to the solid product, **calcium hydroxide** forms.
   When carbon dioxide is blown through a solution of solid product, the solution turns **milky**.

   (b) Calcium carbonate is **insoluble** in water.

   (c) Calcium carbonate is **soluble** in dilute hydrochloric acid. **Carbon dioxide** gas is given off in the reaction.

10.

Reaction	Word equations
Heating calcium carbonate	**Calcium carbonate ⟶ Calcium oxide + carbon dioxide**
Adding a few drops of water to the solid product	**Calcium oxide + water ⟶ Calcium hydroxide**
Blowing through the filtrate	**Carbon dioxide + calcium hydroxide ⟶ Calcium carbonate + water**

11. When rain falls, it reacts with carbon dioxide in the air to form carbonic acid. When the acid comes into contact with underground limestone deposits, it reacts with calcium carbonate to form soluble calcium hydrogencarbonate. The underground limestone deposit is gradually dissolved in this way over millions of years, creating limestone caves.

Experiment 1.6 : Testing the presence of water in copper(II) sulphate crystals

Suggested Flow Chart: